

AMENDMENTS TO THE CLAIMS

Claims 1- 22 (canceled).

23. (Currently Amended) A process for the enzymatic synthesis of incompletely acrylated polyol, which consists essentially of reacting an aliphatic polyol with an acrylic acid compound or an alkyl ester thereof in bulk or in a liquid reaction medium comprising an organic solvent, in the presence of an enzyme which is selected from ~~hydrolases~~ lipases and transfers acrylate groups, and after the end of the reaction optionally isolating the polyol acrylate(s) formed from the reaction mixture and wherein the polyol is a straight-chain or branched or carbocyclic, saturated or unsaturated hydrocarbon compounds having at least 3 carbon atoms and at least 3 (esterifiable) hydroxyl groups in optically pure form or as a stereoisomer mixture, or mixtures of different polyols and wherein the ~~hydrolase is lipases (E.C. 3.1.1.3), glycosylases (E.C. 3.2. .), or proteases (E.C. 3.4. .)~~ lipase is from *Candida antarctica B* or *Burkholderia sp* in free or immobilized form.

24. (Previously Presented) A process as claimed in claim 23, wherein the liquid reaction medium has an initial water content of less than about 10% by volume.

25. (Previously presented) A process as claimed in claim 23, wherein acrylic acid compound and polyol are used in a molar ratio of about 100:1 to 1:1.

26. (Previously presented) A process as claimed in claim 23, wherein the acrylic acid compound is acrylic acid, C₁-C₆-alkyl-substituted acrylic acid, or the alkyl esters of these compounds, or mixtures thereof.

27. (Cancelled)

28. (Previously Presented) A process as claimed in claim 23, wherein the polyol is a straight-chain, branched or cyclic saturated hydrocarbons having 3 to 30 carbon atoms and from 3 to 10 hydroxyl groups.

29. (Previously Presented) A process as claimed in claim 23, wherein a completely acrylated polyol acrylate is added to the reaction medium, the polyol acrylate being the ester of an acrylic acid compound and a polyol as defined in claim 23.

30. (Currently Amended) A process as claimed in claim 23, wherein the polyol is selected from glycerol, diglycerol, triglycerol, 1,2,4-butanetriol, trimethylolmethane, trimethylolethane, trimethylolpropane, trimethylolbutane, 2,2,4-trimethyl-1,3-pentanediol, pentaerythritol, ditrimethylolpropane, dipentaerythritol, tripentaerythritol, D-, L-, and mesoerythritol, D- and L-arabitol, adonitol, xylitol, sorbitol, mannitol, dulcitol or inositols, or the mixtures or alkoxylates thereof.

31.-32 (Cancelled).

33. (Currently Amended) A process as claimed in claim 23, wherein the organic solvent is selected from C₁-C₆ alkanols, pyridine, polyalkylene glycol dialkyl ethers, alkylene carbonate, C₁-C₆ alkyl alkanecarboxylic esters, acetone, 1,4-dioxane, 1,3-dioxolane, THF, dimethoxymethane, dimethoxyethane, or mixtures thereof.

34. (Previously Presented) A process as claimed in claim 23, wherein the enzyme content of the reaction medium is in the range from about 0.01 to 10% by weight, based on the polyol used.

35. (Previously Presented) A process as claimed in claim 23, wherein the reaction temperature is in the range from 0 to about 100°C.

36. (Previously Presented) A process as claimed in claim 23, wherein the reaction medium is single-phase or multiphase and wherein the reactants are present in solution, suspension or emulsion.

37. (Previously presented) A process as claimed in claim 23, wherein alcohol produced during the transesterification or water of reaction produced during the esterification is removed from the reaction solution.

38. (Cancelled)

39. (Previously Presented) A process as claimed in claim 37, wherein a reaction product comprising substantially polyol monoacrylates is reacted with at least one comonomer to form a linear copolymer.

40. (Cancelled)

41. (Previously presented) A reaction product comprising polyol acrylate, obtained by the process as claimed in claim 23.

42. (Currently Amended) A reaction product as claimed in claim 41 containing from about 60 to 100 mol%, based on the total molar number of polyol acrylate, of compounds having both alcohol functionalization and acrylate functionalization.

43-45 (cancelled)

46. (Previously presented) A process as claimed in claim 24, wherein acrylic acid compound and polyol are used in a molar ratio of about 100:1 to 1:1.

47. (Withdrawn) The process as claimed in claim 23, which further comprises thermal or UV curing and wherein the polyol after curing contains extractables which are present in an amount that are less than 5% by weight.

48. (Currently Amended) A process for the enzymatic synthesis of a partially acrylated polyol, which comprises reacting an aliphatic polyol with an acrylic acid compound or an alkyl ester thereof in bulk or in a liquid reaction medium comprising an organic solvent, in the presence of an enzyme which is selected from hydrolases lipases and transfers acrylate groups, and after the end of the reaction optionally isolating the polyol acrylate(s) formed from the reaction mixture wherein the lipase is from *Candida antarctica* B or *Burkholderia* sp in free or immobilized form.

49. (New) A process for the enzymatic synthesis of incompletely acrylated polyol, which consists of reacting an aliphatic polyol with an acrylic acid compound or an alkyl ester thereof in bulk or in a liquid reaction medium comprising an organic solvent, in the presence of an enzyme which is selected from lipasaes and transfers acrylate groups, and after the end of the reaction

optionally isolating the polyol acrylate(s) formed from the reaction mixture and wherein the polyol is a straight-chain or branched or carbocyclic, saturated or unsaturated hydrocarbon compounds having at least 3 carbon atoms and at least 3 (esterifiable) hydroxyl groups in optically pure form or as a stereoisomer mixture, or mixtures of different polyols and wherein the lipase is from *Candida antarctica B* or *Burkholderia sp* in free or immobilized form.

50. (New) A method of coating a substrate which comprises

i) coating the substrate with a coating composition, wherein the coating composition requires

(A) an enzymatic synthesis of incompletely acrylated polyol, which consists essentially of reacting an aliphatic polyol with an acrylic acid compound or an alkyl ester thereof in bulk or in a liquid reaction medium comprising an organic solvent, in the presence of an enzyme which is selected from a lipase and a transfers acrylate group, and after the end of the reaction optionally isolating the polyol acrylate(s) formed from the reaction mixture and wherein the polyol is a straight-chain or branched or carbocyclic, saturated or unsaturated hydrocarbon compounds having at least 3 carbon atoms and at least 3 (esterifiable) hydroxyl groups in optically pure form or as a stereoisomer mixture, or mixtures of different polyols and wherein the lipases is from *Candida antarctica B* or *Burkholderia sp* in free or immobilized form.

ii) removing volatile constituents of the coating material to form a film and

iii) optionally exposing the film to high-energy radiation and

iv) curing the film.

51. (New) The method as claimed in claim 50, wherein the film is (iii) exposed to high energy radiation and

(iv) cured thermally or by NIR radiation.

52. (New) The method as claimed in claim 50, wherein the film is first (iv)

cured thermally or by NIR radiation and then (iii) exposed to high energy radiation

53. (New) The method as claimed in claim 50, wherein the material is a radiation curable and thermally curable coating material.

54. (New) The method as claimed in claim 50, wherein the incompletely acrylated polyol is glyceryl acrylate, trimethylolpropane triacrylate or pentaerythritol acrylate, in the form of mixtures of their mono-, di- or polyacrylates.

55. (New) The method as claimed in claim 50, wherein the film is either

(i) exposed to high energy radiation and then cured thermally or by NIR radiation or

(ii) cured first thermally or by NIR radiation and then exposed to high energy radiation and

wherein the composition comprises the following components:

(A) an incompletely acrylated polyol which is glyceryl acrylate, trimethylolpropane triacrylate or pentaerythritol acrylate, in the form of mixtures of their mono-, di- or polyacrylates,

(B) at least one polymerizable compound other than (A), containing two or more copolymerizable ethylenically unsaturated groups,

(C) optionally reactive diluents,

(D) optionally photoinitiator, and

(E) optionally coatings additives.

56. (New) The method as claimed in claim 50, wherein the film is either

- (i) exposed to high energy radiation and then cured thermally or by NIR radiation or
 - (ii) cured first thermally or by NIR radiation and then exposed to high energy radiation and
- the composition comprises the following components:
- (A) 20-100% by weight of an incompletely acrylated polyol which is glyceryl acrylate, trimethylolpropane triacrylate or pentaerythritol acrylate, in the form of mixtures of their mono-, di- or polyacrylates,
 - (B) 5-50 by weight of a vinyl ether or (meth)acrylate compound,
 - (C) 0-50% by weight of a radiation-curable, free-radically or cationically polymerizable compounds having only one ethylenically unsaturated copolymerizable group,
 - (D) 0-20% by weight of a photoinitiator, and
 - (E) 0-50% by weight of a coating additive.

57. (New) The method as claimed in claim 50, wherein the composition comprises the following components:

- (A) 40-90% by weight of an incompletely acrylated polyol which is glyceryl acrylate, trimethylolpropane triacrylate or pentaerythritol acrylate, in the form of mixtures of their mono-, di- or polyacrylates,
- (B) 5-50% by weight of a vinyl ether or (meth)acrylate compound containing up to 10 copolymerizable unsaturated double bonds,
- (C) 5-40% by weight of a radiation-curable, free-radically or cationically polymerizable compounds having only one ethylenically unsaturated copolymerizable group,
- (D) 0.5-15% by weight of 2,4,6-trimethylbenzoyl-diphenylphosphine oxide, ethyl 2,4,6-trimethylbenzoylphenylphosphinate, hydroxyacetophenone, phenylglyoxylic acid,

benzophenone, acetophenone, acetonaphthoquinone, methyl ethyl ketone, valerophenone, hexanophenone, α -phenylbutyrophenone, p-morpholino propiophenone, dibenzosuberone, 4-morpholinobenzophenone, 4-morpholinodeoxybenzoin, p-diacetylbenzene, 4-aminobenzophenone, 4'-methoxyacetophenone, β -methylantraquinone, tert-butylantraquinone, anthraquinoncarboxylic ester, benzaldehyde, α -tetralone, 9-acetyl phenanthrene, 2-acetylphenanthrene, 10-thioxanthene, 3-acetylphenanthrene, 3-acetylindole, 9-fluorenone, 1-indanone, 1,3,4-triacetylbenzene, thioxanthene-9-one, xanthene-9-one, 2,4-dimethylthioxanthone, 2,4-diethylthioxanthone, 2,4-di-iso-propylthioxanthone, 2,4-dichloro thioxanthone, benzoin, benzoin iso-butyl ether, chloroxanthene, benzoin tetrahydropyranyl ether, benzoin methyl ether, benzoin ethyl ether, benzoin butyl ether, benzoin iso-propyl ether, 7H-benzoin methyl ether, benz[de]anthracene-7-one, 1-naphthaldehyde, 4,4'-bis(dimethylamino)benzophenone, 4-phenylbenzophenone, 4-chlorobenzophenone, 1-acetonaphthone, 2-acetonaphthone, 1-benzoylcyclohexan-1-ol, 2-hydroxy-2,2-dimethyl acetophenone, 2,2-dimethoxy-2-phenylacetophenone, 2,2-diethoxy-2-phenylacetophenone, 1,1-dichloroacetophenone, 1-hydroxyacetophenone, acetophenone dimethyl ketal, o-methoxy benzophenone, triphenylphosphine, tri-o-tolylphosphine, benz[a]anthracene-7,12-dione, 2,2-diethoxyacetophenone, benzil ketal, 2-methyl-1-[4-(methylthio)phenyl]-2-morpholinopropan-1-one, anthraquinone, 2-methyl anthraquinone, 2-ethylanthraquinone, 2-tert-butylantraquinone, 1-chloroanthraquinone, 2-amylantraquinone, or 2,3-butanedione and

(E) 2-40% by weight of an antioxidant, an oxidation inhibitor, a stabilizer, an activator, a filler, a pigment, a dye, a devolatilizer, a luster agent, an antistat, a flame retardant, a thickener, a thixotropic agent, a leveling assistant, a binder, an antifoam, a fragrance, a surface-active agent, a viscosity modifier, a plasticizer, a plastifying agent, a tackifying resin, a chelating agent or a compatibilizer.

58. (New) The process as claimed in claim 50, wherein the film is either

(i) exposed to high energy radiation and then cured thermally or by NIR radiation or

(ii) cured first thermally or by NIR radiation and then exposed to high energy radiation

and the composition comprises the following components:

(A) 60-80% by weight of an incompletely acrylated polyol which is glyceryl acrylate, trimethylolpropane triacrylate or pentaerythritol acrylate, in the form of their mono-, di- or polyacrylates and/or mixtures thereof,

(B) 10-30% by weight of a vinyl ether or (meth)acrylate compound containing 2, 3, 4, or 5 copolymerizable unsaturated double bonds,

(C) 10-30% by weight of a radiation-curable, free-radically or cationically polymerizable compounds having only one ethylenically unsaturated copolymerizable group,

(D) 2-5% by weight of a phosphine oxide, α -hydroxy ketone, or a benzophenone or a mixture thereof, and

(E) 5-20% by weight of an antioxidant, an oxidation inhibitor, a stabilizer, an activator, a filler, a pigment, a dye, a devolatilizer, a luster agent, an antistat, a flame retardant, a thickener, a thixotropic agent, a leveling assistant, a binder, an antifoam, a fragrance, a surface-active agent, a viscosity modifier, a plasticizer, a plastifying agent, a tackifying resin, a chelating agent or a compatibilizer.